

POSSIBILITIES OF PRODUCTION AND SOME QUALITY CHARACTERISTICS OF DRY POULTRY MEAT SAUSAGES

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SUMMARY

Possibility of production and some quality characteristics of dry sausages made of poultry meat with pork or poultry fat tissue (in proportion 60/40) in domestic conditions have been subject of the research.

Dry sausages produced of breast had more proteins and less water comparing to sausages made from thigh meat. Also, amount of water decreased but, quantity of fat and proteins increased through the aging (drying) regardless to which kind of meat or fat was used.

Microbiological examination didn't show presence of any pathogenic microorganisms in raw material or in products. Dominant microflora on end of fermentation proces were lactobacilli (10^8 per g in sausages made of thigh meat, 10^7 per g in sausages made of breast meat).

Weight loss was less (for about 4%) in dry sausages made from thigh meat. Total weight loss was from 32 to 36%.

By sensorial analysis was concluded that using breast meat and poultry fat products could be made. They are acceptable and of specific quality, especially in their flavours.

INTRODUCTION

With in production products of poultry meat rule is to use breast and thigh meat which are the most valuable parts of poultry carcass, Trumić and al.(1974), Holley R.A.and al.(1986). It is also known that between those two kinds of meat there are significant differences chemical and structural, as well as in technological and other characteristics (Dakić,1967), what is of great importance for technology of production and quality of final products.

Last years many works were published about usage of mechanically separated poultry meat (MSPM) and its influence on quality of meat products.

Baran et al.(1973) reported preliminary results on production of dry fermented turkey sausages and according to their results the most acceptable were the sausages produced using method of smoking: 27°C-3 hours; 32°C - 4 hours and 47°C - 5 hours. Prolonged time of smoking, gives the product undesirable biting acid taste.

Analysing influence of different quantities of MSPM in production of fermented sausages by using starter cultures, Holley R.A. and al.(1986), conclude that adding up to 15% MSPM do not effect microbiology of product, and using of 10% MSPM couldn't be traced in organoleptical analysis.

Influence of adding different quantities of MSPM of turkey and chicken on quality characteristics of fermented sausages was investigated by the other authors too: McMahon and Dawson,(1976); Dhillon A.S. and Maurer A.J. (1975).

Dawson (1970) was examining semidry fermented sausages that contain poultry or turkey meat in combination with 25% or 50% of beef. According to this author, sausages which contained only poultry or turkey meat were organoleptically estimated as worse than those produced with addition of beef.

Keller and Acton (1984), used lyophilized and frozen concentrates of *Pediococcus cerevisiae* in production of semidry fermented sausages. They surveyed number of bacteria during the process of production; water holding capacity, chemical composition, pH, weight loss and sensor characteristics. Authors announce that total bacterial counts was up to 10^5 and weight loss was 20-25% for 10-12 days drying period. Water-content was from 43,8% to 47,8%, albumen content 34%.

Survival of chosen pathogenic microorganisms during production of fermented turkey sausages was subject of research by Baran and Stephenson (1975).

Nedeljković and Bogojević (1979), giving analysis of poultry meat products of Yugoslavian market, affirm that dry sausages made of poultry meat aren't present. The authors point that poultry meat industry should, first in research and then in production, approach solving of this problem and offer these products to the market, having good chances to find wide acceptance.

In this work, we set our task as to examine possibilities of production of dry sausages made of poultry meat and some of their quality characteristics.

MATERIALS AND METHODS

For experimental production of dry sausages made of poultry meat frozen breast meat was used, then broiler thigh meat, poultry fat, pork fat tissue, salt, sugar, sodium nitrite and spices. Proportion between meat and fat was 60:40. Mix was prepared in cutter using usual procedure and stuffed in to pig's small intestines which were paired on 12 cm length. Smoking and drying of the product was done in climate-chamber in Yugoslavia under following conditions: ripening and smoking - 2 days under 18°C and 88% relative humidity; drying - 12 days under 18°C and 86 to 72% relative humidity.

Chemical and physical investigations included changes of basic chemical indicators: water, fat, proteins (A.O.A.C. method), pH (pH-meter Ma 5722 "Iskra" YU) and a_w values (a_w -Wert Messer "Lufft" - Germany).

Microbiological determination performed identification of *E.coli*, *Proteus* species, *Salmonellae*, coagulase positive *Staphylococcus* and sulphite reducing *Clostridia* under Yugoslav regulations and identification of all susceptible colonies under Bergey (1975).

Examinations, also include determination of number of lactobacillus and micrococcus.

Organoleptical examination was performed with experts, using method of description of colour appearance and binding of stuffing, consistency, smell and flavour.

Weight loss during aging was determined on the differences of weight before and after every fase of production and are calculated in percentes.

RESULTS AND DISCUSSION

Average physico-chemical values of examined samples of dry sausages, during production, are represented in table 1. There is obvious that content of water and proteins is higher and content of fat lower in stuffing of dry sausages made from breast meat comparing them with sausages made from broilers thigh meat not depending on fat tissue that is used. Those results were expected, because of different chemical composition of used meat. On the other hand, content of water decreases and fat and proteins increases during aging time, what is in compliance with examinations of Keller and Acton (1974). Sausages made from breast meat had higher amount of proteins and less water comparing to sausages made from thigh meat. Differences in chemical composition of final product could be explained also like weight loss during aging.

From reported results of chemical analysis it could be also concluded that prolonging the time of aging of sausages the proportion of

Results of microbiological examination showed that there was not found pathogenic bacteria in both of analysed sausages (Salmonella, Proteus species, E.coli, Sulphite reducing Clostridia and coagulase positive Staphylococcus).

Dominant microflora, of raw material and stuffing for dry sausages and sausages examined after smoking was represented by Micrococcus, Bacillus and Gram negative microorganism (Pseudomonas, Achromobacter). At the same time lactobacilli were determined only by technique of enriching. Trough the aging time on the 3rd day already the number of Lactobacillus was increased, but other kinds of microorganisms except micrococci were not isolated. Number of micrococci in sausages made from breast meat was gradually decreasing and in sausages made from thigh meat it slightly increased (graphic 1). In next period of 5 days of aging, number of lactobacilli was increasing, and in sausages made from breast meat was 10^6 , in thigh meat 10^7 per g. On the ninth day of examination dominant microflora in sausages made from breast meat showed lactobacilli and micrococci were decreasing to 10^1 . In sausages made from thigh meat number of lactobacilli was 10^8 and micrococci 10^2 . On the last day of examination dominant microflora of both kinds of sausages were Lactobacilli.

Results of examination of dry sausages, from the other authors, also show that lactobacilli are the dominant microflora in the last week of fermentation, Molley R.A.(1986), Nurni E.(1966), Hofmann H. and Scharnen (1980).

Weight loss of examined dry poultry sausages

Table 1. Indicators of physico-chemical charges in dry poultry sausages

Mark of product	Time of examination	Water %	Fat %	Proteins %	Water/proteins	Fat/proteins	pH	a _w	Mark of product	Time of examination	Water %	Fat %	Proteins %	Water/proteins	Fat/proteins
A	Initial mix	52.60	24.17	18.80	2.97	1.28	5.72	0.97	C	Initial mix	54.24	21.08	18.98	2.85	1.11
	2 day	49.93	27.08	18.86	2.64	1.93	5.57	0.94		2 day	54.50	21.80	19.05	2.86	1.14
	5 day	34.50	39.00	20.68	1.66	1.88	5.47	0.91		5 day	31.82	45.65	16.46	1.93	2.77
	14 day	20.26	49.74	22.23	0.91	2.23	5.45	0.87		14 day	21.72	52.33	20.51	1.05	2.55
B	Initial mix	50.65	30.08	15.36	3.29	1.95	6.08	0.95	D	Initial mix	48.29	30.14	17.19	2.80	1.75
	2 day	47.53	32.31	15.94	2.98	2.06	5.68	0.92		2 day	48.40	30.20	17.25	2.80	1.75
	5 day	34.19	43.10	18.69	1.82	2.30	5.57	0.90		5 day	31.58	42.64	18.98	1.66	2.24
	14 day	23.97	52.85	21.87	1.09	2.41	5.36	0.89		14 day	25.38	50.47	19.23	1.31	2.63

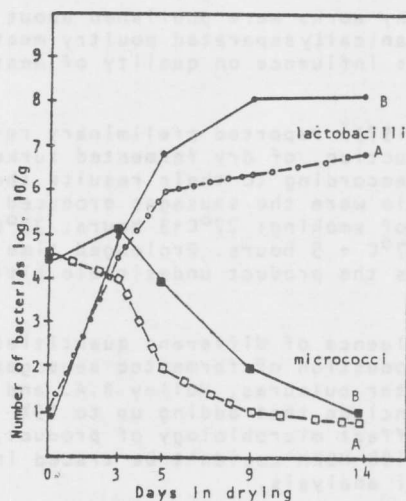
A - Sausages from breast meat and pork fat
B - Sausages from thigh meat and pork fat

C - Sausages from breast meat and poultry fat
D - Sausages from thigh meat and poultry fat

water and proteins, is decreasing, and the proportion fat: protein is increasing. Proportion/water: proteins is higher in the sausages made of thigh meat, that is in compliance with results of Froning and Normann (1966), and that also means that breast meat have better water holding capacity than the thigh meat.

pH values and a_w values were analysed only in sausages that had pork fat tissue.

In the beginning of aging of sausages made from thigh meat it was noticed that the pH falls faster. Reached values for pH and a_w could be acceptable for this kind of products.



Graph.1. Growth of lactobacilli and micrococci in dry poultry sausages

trough the time of aging (table 2), show that average loss during riping and smoking until the 5th day of aging is nearly the same (20.20 and 20.03%) for the both kinds of sausages where pork fat was used.

Table 2. Weight loss (%) in production of dry sausages from poultry meat

Mark* of pro- duct	Time of examination				
	After ripping	After smoking	After 5 days	After 9 days	After 14 days
A	2.33	4.95	20.20	28.31	35.43
B	2.85	5.93	20.03	27.92	32.01
C	4.01	6.70	19.64	24.26	36.76
D	4.23	6.41	16.91	23.91	32.94

* As same as in table 1.

Opposite to that, weight loss for sausages, in which production poultry fat was used, were less especially for the sausages with thigh meat. Between the 5th and the 9th day of aging weight loss of all products had a small increase. The last values of weight loss of sausages from breast meat, regardless to the kind of fat that was used, was nearly the same (34.43%, respectively 36.76%). The same results were obtained when the sausages from thigh meat are in question (32.01% and 32.74%). However, the values that were obtained at the end of the production were about 4% less (for the sausages made of thigh meat) compared to the sausages made of breast meat. Differences that are found in weight loss through the production of dry poultry sausages, under our opinion, could be explained by different losses of water and fat from sausage stuffing, depending on which kind of meat and fat was used. Results of our analysis about drip losses of dry sausages are in compliance with results of Baran et al. (1973).

Results of sensorial evaluation showed that the products in question have different organoleptical characteristics. Application of different kind of poultry meat and different kind of fat in production of sausages, with all other factors that influence aging, made the different variations in their characteristics. The colour of surface, and cross section of sausages made from breast meat, regardless to which kind of fat was used, was pink and from thigh meat was dark red and more resembled on the colour of dry sausages made of pork or beef.

Coherence of stuffing, that is of pieces of meat and fat, was judged higher in sausages made from breast meat and pork fat compared to sausages made of thigh meat and poultry fat. This also had influence of stuffing consistence, so that the sausages made from breast meat were firmer (compact) than sausages made from thigh meat (semi-firm). Namely, reviewers had the opinion that the sausage made from thigh meat was not aged enough, and that drying should be continued for couple of days. There is presumed that better coherence of the stuffing pieces could be gained by better technology of production and by

using poultry fat. With regard to smell there were no significant differences. All products had characteristic smell of aged and smoked products, slightly more expressed in sausages made of thigh meat. The most significant differences were noticed regarding the flavour. The sausages made from breast meat and poultry fat, or pork fat had a specific, very pleasant flavour that is not characteristic for this kind of products. Regarding this characteristic the product could be put in the group of products with new flavour. Contrary to that, sausages made from thigh meat had a typical flavour in dry sausages, with a bit more sourish flavour. It is certain that future researches should give more answers regarding organoleptical characteristics of the product and first of all for the flavour of product.

CONCLUSION

On the basis of performed analysis and obtained results it could be concluded that there are possibilities for production of dry sausages with special characteristics, by using poultry meat, poultry fat and pork fat applying corresponding technology. Also the products are in compliance with the pre-established regulations.

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